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THE FAMILY XANTUSIIDAE

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KARYOTYPIC VARIATION AND EVOLUTION OF THE LIZARDS IN THE FAMILY XANTUSIIDAE

By ROBERT L. BEZY¹

ABSTRACT: Diploid chromosome numbers of ten species of the family Xantusiidae range from 36 to 40 with 16 to 18 macrochromosomes, 18 to 22 microchromosomes, and 50 to 58 chromosome arms. Seven pericentric inversions, the loss of two pairs of microchromosomes, two centric fusions, and the formation of satellites on one pair of chromosomes explain the variation observed. Intraspecific karyotypic variation occurs in *Xantusia vigilis* and *Xantusia henshawi*. Chromosomal differences suggest that *Lepidophyma smithi* and *Lepidophyma occulor* are specifically distinct. Chromosomal similarities are consistent with the inclusion of (1) *Klauberina riversiana* in the genus *Xantusia*, and (2) *Gaigeia gaigeae* in the genus *Lepidophyma*. Of the several groups of lizards that have been considered related to xantusiids, the microteiids have the most similar karyotypes. At present, there is no evidence to indicate that hybridization preceded the evolution of unisexuality in *Lepidophyma flavimaculatum* from Panama and Costa Rica, in that (1) the karyotype is primarily diploid and homomorphic; and (2) there are no plausible parental species known to occur in the area.

INTRODUCTION

In Camp's (1923) monumental classification of lizards, the species of the family Xantusiidae bridged the morphological gap between the two divisions (Ascalabota and Autarchoglossa) of the suborder Sauria, a systematic dilemma which he resolved by arbitrarily depositing them in the Autarchoglossa. Subsequent workers have also found this morphologically ambivalent family annoying and have shifted it between these divisions. In actuality, these lizards may well be relicts of the departure point of the two major lines of saurian evolution and thus might reasonably be placed in a third division, a taxonomic honor which many systematists might be hesitant to bestow on this small family.

Not only have xantusiid lizards been troublesome to students of "higher classification," but those unfortunate taxonomists who have been lured into extensive studies of the systematics of the family have suffered greater torments. Within this handful of species there occurs nearly every conceivable degree of morphological divergence. Many problems are encountered by a systematist attempting to define subspecies, species, and genera in

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this small family because the morphological differences between populations do not tend to fall into discrete sizes that can be easily assigned rank. In partitioning this array of only about 14 species into genera, one must steer between the Scylla of monotypic genera and the Charybdis of a monotypic family. Cope (1895) recognized five Recent genera, all of which were monotypic except *Xantusia*, and one of which (*Amoebopsis gilberti*) contained what is currently recognized as only a subspecies (*Xantusia vigilis gilberti*). Savage (1963) recognized four Recent genera of which two (*Xantusia* and *Lepidophyma*) were polytypic and two (*Cricosaura* and *Klauberina*) were monotypic. In this study, these lizards are treated as two groups: *Xantusia* (inclusive of *Klauberina*) and *Lepidophyma* (inclusive of *Gaigeia*); *Cricosaura typica* has not yet been studied karyotypically.

Xantusiids have extremely disjunct distributions, a characteristic generally attributed to primitive, receding groups. Ranges of most of the species are extremely fragmented and populations are often isolated by hundreds of miles. Particularly spectacular examples are the occurrence of *Xantusia vigilis* and *Xantusia henshawi* in Durango, Mexico, ca. 400 to 800 air-line miles southeast of the nearest known populations of these species (Webb, 1965, 1970) and the insular isolation of *Xantusia riversiana* and *Cricosaura typica*. The occurrence of the Eocene fossil, *Paleoxantusia fera* (Hecht, 1956), in Wyoming, ca. 300 miles north of the present northern limit of the family, adds a time dimension to the receding of xantusiids.

Sympatric contacts have been reported for only two pairs of currently recognized species in the family Xantusiidae: *Xantusia henshawi* and *X. vigilis* in southern California (Klauber, 1931) and Durango, Mexico (Webb, 1970) and *Lepidophyma tuxtlae* and *L. pajapanensis* in southern Veracruz (Werler, 1957). When the lack of sympatry in this family is combined with extreme variability in morphological divergence at the population level, the task of defining evolutionarily meaningful (or even morphologically consistent) species becomes difficult (Bezy, 1967b). Further, strong selective pressure for saxicolous adaptations in highly isolated populations of xantusiids has led to morphological convergence at the subspecies level (*Xantusia vigilis arizonae* and *X. v. sierrae*, Bezy, 1967a, b), at the species level (*Xantusia vigilis arizonae* and *X. henshawi*, Klauber, 1931), and at the near-generic level (*Xantusia* and *Gaigeia*, Smith, 1939).

This analysis of karyotypic variation has been undertaken in the hope of finding new data to help establish meaningful phylogenetic relationships in this small but puzzling family. Karyotypes of ten species of xantusiids are reported and discussed herein: *Xantusia henshawi* Stejneger, *X. vigilis* Baird, *X. riversiana* Cope, *Lepidophyma flavimaculatum* A. Dumeril, *L. gaigeae* Mosauer, *L. micropholis* Walker, *L. occular* Smith, *L. pajapanensis* Werler, *L. smithi* Bocourt, and *L. tuxtlae* Werler and Shannon. The biogeographical, morphological, and karyotypic information indicates that these are all valid species as will be discussed in a separate paper on the systematics of the genus